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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,093	03/22/2004	Paul Caprioli	SUN-P9699-MEG	3838

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EXAMINER	
MOLL, JESSE R	

ART UNIT	PAPER NUMBER
2181	

DATE MAILED: 08/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/807,093	CAPRIOLI ET AL.	
	Examiner	Art Unit	
	Jesse R. Moll	2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

FRITZ FLEMING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100
8/2/2006

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-21 have been examined.

Acknowledgment of papers filed: Amendment filed on 24 May 2006. The papers filed have been placed on record.

Drawings

2. The drawings were received on 24 May 2006. These drawings are acceptable.

Terminal Disclaimer

3. The terminal disclaimer filed on 24 May 2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 10/686,061 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Withdrawn Objections/Rejections

Applicant, via amendment has overcome the objection to the title. The objection has therefore been withdrawn.

Applicant, via terminal disclaimer, has overcome the double patenting rejection. The rejection is therefore withdrawn.

Applicant, via terminal disclaimer, has overcome the rejection under 35 U.S.C. 112. The rejection is therefore withdrawn.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Chaudhry et al. (U.S. Patent Application Publication 2005/0081195 A1) herein referred to as Chaudhry.

6. Regarding claim 1, Chaudhry discloses a method for dynamically adjusting the aggressiveness of an execute-ahead processor, comprising:

executing instructions in an execute-ahead mode (Execute-Ahead Mode 204; see fig. 2), wherein instructions that cannot be executed because of an unresolved data dependency are deferred, and other non-deferred instructions are executed in program order (see paragraph 39), and wherein if a non-data-dependent stall condition is encountered, the execute-ahead processor enters a scout mode (Scout Mode 208; see fig. 2; see paragraph 43), wherein instructions are speculatively executed to prefetch future loads, but results are not committed to the architectural state of the execute-ahead processor (see paragraph 43, last 3 lines); if an unresolved data dependency is resolved during the execute-ahead mode, executing deferred instructions in a deferred mode (see paragraph 40, first 5 lines); wherein if some instructions are deferred again during the deferred mode (see paragraph 42), the method further comprises, determining whether to resume execution in the execute-ahead mode (the processor always to resume execution in the execute-ahead mode), if it is determined to do so, resuming execution in the execute-ahead mode, and otherwise resuming execution in a non-aggressive mode (it is never determined to do so).

Note that it is always determined to resume execution in the execute-ahead mode. Therefore, the limitation "resuming execution in a non-aggressive mode" does not need to be met because it is never determined not to resume execution in the execute-ahead mode.

7. Regarding claim 2, Chaudhry discloses the method of claim 1, wherein resuming execution in the non-aggressive execution mode involves remaining in

the deferred mode until all deferred instructions are executed and the execute-ahead processor returns to a normal execution mode (it is never determined to do so; see above regarding claim 1).

8. Regarding claim 3, Chaudhry discloses the method of claim 1, wherein resuming execution in the non-aggressive mode involves resuming execution in a non-aggressive execute-ahead mode, wherein if a non-data-dependent stall condition is encountered, the execute-ahead processor does not enter the scout mode, but instead waits for the non-data-dependent stall condition to be resolved, or for an unresolved data dependency to return, before proceeding (it is never determined to do so; see above regarding claim 1).

9. Regarding claim 4, Chaudhry discloses the method of claim 1, wherein prior to executing instructions in execute-ahead mode, the method further comprises entering the execute-ahead mode (see paragraph 37, lines 1-3) by: issuing instructions for execution in program order during a normal execution mode (see paragraph 36); upon encountering an unresolved data dependency during execution of an instruction (see paragraph 37, lines 1-3), generating a checkpoint that can subsequently be used to return execution to the point of the instruction (see paragraph 38), and executing subsequent instructions in the execute-ahead mode (see paragraph 39).

10. Regarding claim 5, Chaudhry discloses the method of claim 4, wherein if a launch point stall condition is finally resolved, the method further comprises using the checkpoint to resume execution in the normal execution mode from the launch point instruction (the instruction that originally encountered the launch point stall condition) (see paragraph 46).

11. Regarding claim 6, Chaudhry discloses the method of claim 1, wherein executing deferred instructions in the deferred mode involves: issuing deferred instructions for execution in program order (see paragraph 40, lines 1-5); deferring execution of deferred instructions that still cannot be executed because of unresolved data dependencies; and executing other deferred instructions that are able to be executed in program order (see paragraph 40, second half).

12. Regarding claim 7, Chaudhry discloses the method of claim 6, wherein if all deferred instructions are executed in the deferred mode, the method further comprises returning to a normal execution mode to resume normal program execution from the point where the execute-ahead mode left off (see paragraph 41).

13. Regarding claim 8, Chaudhry discloses the method of claim 1, wherein the unresolved data dependency can include: a use of an operand that has not returned from a preceding load miss; a use of an operand that has not returned from a preceding translation lookaside buffer (TLB) miss; a use of an operand

that has not returned from a preceding full or partial read-after-write (RAW) from store buffer operation; and a use of an operand that depends on another operand that is subject to an unresolved data dependency (see paragraph 37).

14. Regarding claim 9, Chaudhry discloses the method of claim 1, wherein the non-data-dependent stall condition can include: a memory barrier operation; a load buffer full condition; and a store buffer full condition (see paragraph 43).

15. Claims 10-18 recite equivalent limitations as claims 1-9 respectively and are rejected under the same grounds.

16. Claim 19 recites equivalent limitations as claims 1 and 10 and is rejected under the same grounds of rejections.

17. Claim 20 recites equivalent limitations as claims 2 and 11 and is rejected under the same grounds of rejections.

18. Claim 21 recites equivalent limitations as claims 3 and 12 and is rejected under the same grounds of rejections.

Response to Arguments

19. Applicant's arguments filed 24 May 2006 have been fully considered but they are not persuasive.

Applicant states:

> Applicant respectfully point out that, unlike in Chaudhry, the present invention has the option of remaining in deferred mode 206, or returning to execute-ahead mode 204 (see FIG. 2 OPTION B, and paragraph [0043] of the instant application). The decision of whether to return to execute-ahead mode or to remain in deferred execution mode can depend upon, for example, on the number of instructions that have been executed in execute-ahead mode (see paragraphs [0044]-[0048] of the instant application). Deciding whether to return to execute-ahead mode or return in deferred execution mode is beneficial because it provides a technique for dynamically adjusting the aggressiveness of the processor.

FWF 8/2/2006

Examiner disagrees. As claimed, the invention is ~~no~~ not limited to have that option. Claim 1 states "**if it is determined to do so**, ... otherwise resuming execution in a non-aggressive mode." As stated in the previous Office Action, when some instructions are deferred again during the deferred mode, it is always determined to resume execution in the execute-ahead mode. The invention of Chaudhry always determines to resume execution in the execute-ahead mode. Therefore every time it is determined not to resume in the execute-ahead mode (never), the processor would resume execution in a non-aggressive mode. The claim does not make that option necessary, but merely states that the processor resumes execution in a non-aggressive mode ***if*** it is determined not to resume execution in the execute-ahead mode.

Conclusion

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse R. Moll whose telephone number is (571)272-2703. The examiner can normally be reached on M-F 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fritz M. Fleming can be reached on 571-272-4145. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jesse R Moll
Examiner
Art Unit 2181

JM 8/1/06

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